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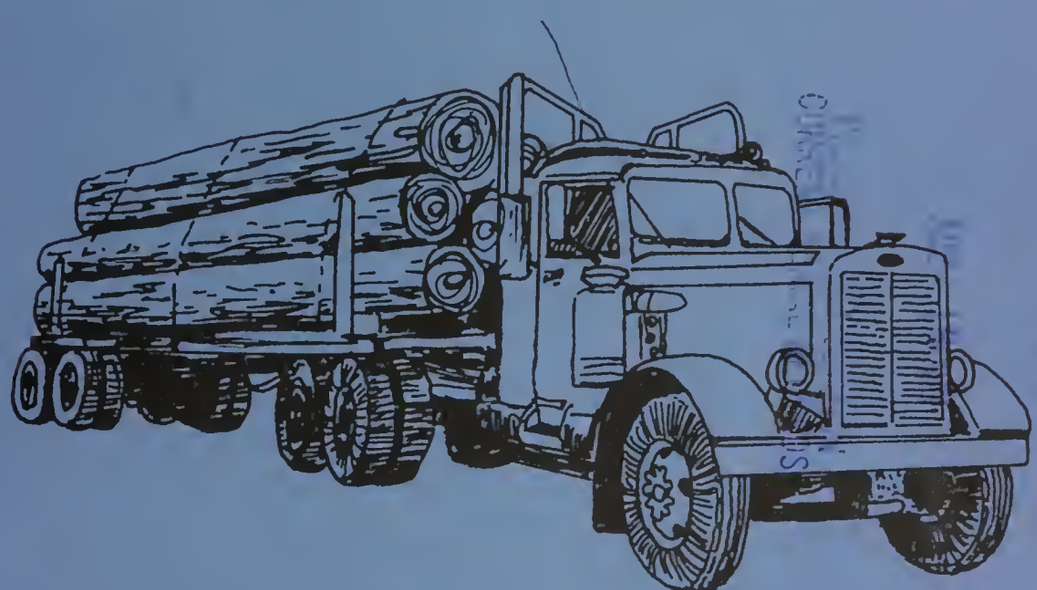
RESERVE

SAMPLE WEIGHT-SCALING WITH 3P SAMPLING FOR MULTI-PRODUCT LOGGING



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SAMPLE WEIGHT-SCALING with 3P SAMPLING for MULTI-PRODUCT LOGGING

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INTRODUCTION

Determining the volume of a truck load of logs by weighing the load has been proven over the years to be very successful. It eliminates the time-consuming chore of scaling all loads of logs. With this system, all loads are weighed and sample loads selected for scaling by some random method. The scaled volumes provide a relationship of board feet to pounds, which is used in determining the total volume of all loads.

This method worked very well until the advent of tree length logging, where logs were presented for scaling that contained several products within one piece. Buyers and sellers wanted to know how much material was changing hands by product, such as peeler logs, sawlogs, stud logs, poles, posts, pulp, and in some cases unuseable material because of some form of wood or product defect. A more sophisticated weight-scaling method was needed to satisfy these requirements.

With the application of 3P Sampling and a computer program especially designed to provide the above information, volumes by product may be obtained. In addition to this, the time required to determine the volume of the sample load is reduced with an improved accuracy of the final calculated volume.

SAMPLE WEIGHT SCALING WITH 3P SAMPLING FOR MULTI-PRODUCT LOGGING

Sample Weight Scaling with 3P Sampling (SWS3P) employs the multi-stage sampling concept where two populations are to be sampled. The first population to be considered is the loads of logs as they arrive at the mill landing, this may be referred as the first stage sample. The second population to be sampled is the logs that make up the sample loads, or the second stage sample. Where there are two stages, the first stage sampling error will usually be relatively larger than the second stage error. When these errors are combined, the total sampling error cannot be reduced below the larger of the two errors, without taking more samples.

COMPUTING THE NUMBER OF SAMPLE LOADS

The intensity of any sampling method depends on the accuracy desired by the sampler. To determine the number of samples needed for each of the two stages, some error limit (E) must be assigned and a Coefficient of Variation (CV) established for each. Then, from the formula $\frac{t^2CV^2}{E^2}$, the number of samples needed can be determined for each of the two sampling stages. The combined sampling error of the first and second stage sample can be calculated by $Es = \sqrt{E_1^2 + E_2^2}$.

The Coefficient of Variation (CV) of the first-stage sample is an expression of the weight difference of a unit of measure that can be expected to occur in the selected sample loads. The (CV) of the second-stage sample is an expression of the ratio of the actual quantity divided by the estimated quantity of the sample logs.

Thus, the number of loads to be sampled may be calculated by the following formula that includes the total number of truck loads from which the first stage sample will be selected.

$$n = t^2(CV)^2 \Big/ \left(E^2 + \frac{t^2(CV)^2}{N}\right)$$

Where:

n = number of sample loads needed
t = given probability (1 for 67% level, 2 for 95% level)
CV = Coefficient of Variation in percent
E = Desired sampling error
N = Total number of truck loads

For example, assume that a tract of timber contains approximately 1,500,000 cubic feet of wood products (or about 5,250,000 board feet). It is to be hauled on trucks that usually haul about 1,200 cubic feet (or about 4200 board feet) per load, with an experienced CV of $\pm$ 8% to a $\pm$ 2% sampling error 95 times out of 100, or t is equal to 2. The number of sample truck loads is calculated as follows:

$$\frac{1,500,000}{1,200} = 1,250 \text{ truck loads}$$

Therefore:

$$n = 2^2 \ (8)^2 \Big/ \left(2^2 + \frac{2^2(8)^2}{1250}\right)$$

$$= 256 \ / \ 4.2048$$

$$= 60.88 \text{ sample loads or a sample of 1 in 20}$$

The sampling technique used to select the sample loads may be any system that does not bias the sample.

COMPUTING THE NUMBER OF SAMPLE LOGS

Determining the volume of the sample load is done with a 3P sample of the logs within the load. The principle of 3P (Probability Proportional to Prediction) is to make a volume prediction of each log on the load and select the sample logs through the use of a set of random numbers. The exact volume of each sample log is very carefully determined so as to calculate an adjustment and expansion factor.

After the sample load frequency has been determined, an estimate of the approximate number of logs per sample load is made, based on the best knowledge you have of the trees to be cut and size of trucks to be used. This estimate is needed for determining the population from which the 3P sample will be taken. Samples are then selected with the use of a specially prepared list of random integers.

A list of random integers or random numbers must be used for each separate sample. The numbers will be generated by the RN3P computer program on the basis of the number of samples needed to obtain a desired sampling error. The following information is needed:

(a) LIM - This is the number of random numbers needed to select sample logs from the sample loads. The LIM can be computed by taking the total number of loads to be included, divided by the sample load frequency, times the average number of logs per load.

Example: $$T = \overline{X}\left(\frac{N}{f}\right) = 50\left(\frac{1250}{20}\right)$$

Total number of loads (N)	1250
Sample frequency (f)	1-20
Number of sample loads to be scaled (n)	63
Average number of logs per load $(\overline{X})$	50
Estimated number of logs in the sample loads (T)	3125
(Increase the estimated number of random numbers by 15%, 3125 x 1,15 - 3594)	
Random numbers are in pages of 500, therefore round up to next 500 -	4000

(b) K - This is the gross volume of the larger logs in the population to be sampled - but not the largest log. A log is considered to be one log, regardless of how many scaling segments or products it may contain. Logs that are larger than "K" are classed as sure-to-measure logs with an equal (=) sign recorded in column 11 of the log scale sheet (Exhibit 3). The number of sure-to-measure logs should not exceed 10% of the sample by count.

Random numbers and predictions should be in cubic feet rather than board feet, as small logs do not contain board feet but do contain chipable material.

(c) KZ - The value given "KZ" determines the sampling frequency, and it is the total of all predictions, divided by the number of samples desired.

For example, if an average load of logs contains 1200 cubic feet, and 61 sample loads are needed:

$$1200 \times 61 = 73200 \text{ cubic feet}$$

The desired number of sample logs is 100; therefore,

$$\frac{73200}{100} = 732$$

To determine the number of sample logs, either of the following two formulas may be used:

$$n = \frac{t^2 CV^2}{E^2} \qquad \text{or} \qquad n = t^2(CV)^2 \Big/ \left(E^2 + \frac{t^2(CV)^2}{N}\right)$$

where:

CV = coefficient of variation anticipated by the person making the prediction.

E = desired sampling error.

t = given probability.

n = number of sample logs.

N = total number of logs included in sample.

Note: It has been found that, by adjusting the KZ so as to obtain at least 3 to 5 sample logs per sample load, the buyer and seller have a better feeling of the final volume. This practice usually results in grossly oversampling the second stage sample. Therefore, reducing the sample error of the second stage to a point where it is of little significance.

FIELD PROCEDURE

Loads of logs to be sampled from the first stage sample should be adequately spread on the ground to provide the log scaler a good view of each log. The volume of each log is estimated and recorded on sheet 1, Exhibit #1, and the estimate is compared with the list of random numbers, Exhibit #2. If the prediction or estimate is equal to or greater than the number, the log becomes a sample; prediction greater than "K" becomes sure-to-measure. All other logs whose predictions are less than the random number or are compared with a "null" do not become samples, and therefore, are not measured. (Nulls, are those numbers shown on the random number list as "-99999" or "0".)

Predictions greater than "K" should be specially identified by some unique code (i.e., K, X, S, ...etc.) on the log prediction tally sheet, (Exhibit 1), rather than recording the predicted volume, by using a unique code letter, it will not be included in the stratum predicted aggregate. If larger than "K" predictions are included in the aggregate and considered also as a sure-to-measure tree, the result will increase the frequency values for the other 3P selected trees, therefore indicating more than their true represented volume. In addition, the sure-to-measure tree volume will be added to that already excessive volume.

Stratum Code: Nine stratum codes are available to the user in the program (1 through 9). Each stratum is independent of the next when calculating volumes. Within a given stratum, the predicted aggregate, number of samples selected and the predicted volume of the sample selected are used to calculate the frequency factor to expand the actual volume of the selected sample. This is done for each stratum independently, with a separate total for each.

With the use of strata, the user may be sampling as many as nine small, independent populations at the same time. A population may be by species, or species group, product (i.e., sawlogs, pulpwood, log quality, etc.) dead logs or several other breakdowns for which separate information is desired. It is imperative that an adequate sample is selected from each of the stratum used so that final adjusted volume can be calculated. Carefully consider the use of stratum and how intensively each stratum is sampled before beginning the field work.

Volume predictions of all logs on the sample loads are made by the scaler with the aid of very few measurements. Those measurements that are taken are usually to assist in making volume estimates on very large logs or logs that are of a size not normally experienced in a day's work. To assist the scaler during a training period, a volume table may be used that gives the approximate volume of a log with various lengths and diameters. Log predictions are compared with the random numbers, samples are indicated on the recording sheet #1, and the sample log marked so as to identify it later.

Measurements of the sample log are recorded on sheet 2, Exhibit #3. It provides for 5 products, 3 of which are for any method desired for log scaling and 2 for length and diameter only. Calculations to determine the cubic foot volume of all products are made using Smalian's Formula. Procedures for recording the log measurements will be discussed later in Data Input.

The predictions are made on Sheet 1 (Exhibit 1) and are totaled by stratum, so they may be used later in the computer program to calculate frequency factors for each of the sample logs. Sheet 2 (Exhibit 3) is completely filled out at the time of scaling the sample log and is submitted for card punching without any further summarizing.

INPUT DATA

The program uses three control cards (Exhibit 5) and is not limited to the amount of input data, except that final answers may overload the space available and will be printed as ******. Format for printing the Stratum and Product Report is F11.2, and for the Cubic Feet by Product Report is F11.1

Control Card 1

Column		
	1-4	Reg_
	5-16	Forest
	17-28	District
	29-40	Purchaser
	41-52	Sale Name
	53-58	Date
	*59-67	Blow up factor Total wt/sample wt (example 9.0540)
	68-80	Reserved for date of run and page number

*Blow up factor (F9.4) if used, must be in columns 59-67. Other information may be arranged as desired.

Control Card 2

This card may be left blank, as the information is not needed in the calculations, but is available to show on the printout the number of predictions that make up the totals for control card 3. There are nine strata and 8 columns in each stratum. (0-8) (9-16) (17-24) (25-32) (33-40) (41-48) (49-56) (57-64) (65-72)

Control Card 3

Needed here is the total of all predictions by stratum that are to be represented by the sample log data. Format is the same as for Card 2.

Data Cards

Recording of log measurements on sheet 2. (Exhibit 3)

Column

1-5 This field shows the sample log number. The five spaces may be used in any manner the user wishes. As a suggestion, it may be used to record the last 3 digits of the Truck Ticket and 2 digits for the log number.

6-9 This field shows the estimated or predicted volume given the log at the time it was selected as a sample. When several products are being hauled on the same load, cubic estimates are more representative than board feet estimates, particularly when small logs and pulpwood are included.

10 This field shows the value stratum with a single character code from 1 to 9. The stratum code may be used to identify species, species groups, products or values. For each stratum, the Mean, Coefficient of Variation and Sampling Error, will be calculated.

11 This field is entered with an asterisk (*) for 3P sample logs and an equal (=) for sure to measure logs. Sure to measure logs are those that have

a. a prediction greater than "K".
b. large amounts of defective wood.
c. sound defect, i.e., sweep, crook, knots.
d. very high value where there would be a small sample.

The "Product" code is to separate and identify the various products within a log, and is not card punched.

For example:

If Product "A" has been assigned to represent sawlogs and "B" peeler logs, this coding would continue through the duration of the period, and recording would be in the proper columns.

The user will be given a volume summary for each product code used. (A through E)

12-14 Segment Length. The total length of a given product is entered to the closest tenth foot including trim.

15-17 Top Diameter. The top diameter of the product may be measured to the closest tenth of an inch. If diameters are rounded to the closest inch, the "0" must be recorded and punched in column 17.

18-20 Bottom Diameter. Same recording instructions as above. If diameters are rounded to the closest inch, the "0" must be recorded and punched in column 20.

21-24 Net Scale. This field is for recording the total net scale of the product even though it may contain two or more segments. Any scale rule desired may be used, as the volume recorded in these columns are expanded in relation to their own value, but must be consistent throughout the sample.

25-28 Defect. This field is for recording the defect for the segment or segments representing the net scale, and must be the same units of measure.

29-62 Product B & C recording is the same as for Product A.

63-80 Products D and F. The recording of length and diameter is the same as product "A". For these products there is no provision for net scale and defect. Cubic volume and linear feet are calculated and expanded by the program.

OUTPUT DATA (EXHIBIT 5)

At the top of each page, the information punched on control card 1 will appear. In addition, the Date of Run and the Page number will be shown. The information from control card 2 if left blank will show 9 zeros, otherwise, the number of predictions by stratum, followed by the sums of the estimates that were entered on control card 3.

The Input and Frequency Summary shows the field data input and calculates the cubic foot volume by product, the total cubic foot volume, and the frequency factor for each sample log.

Stratum and Product Report. This report gives a total net and defective volume by stratum by product in whatever unit of measure used by the scaler for products A, B, and C. Products D and E are shown in linear feet.

Cu. Ft. By Product Within Strata Report. This report gives the total gross cubic foot volume by stratum by product for the entire input data. Cubic volumes are based on Smalian's Formula.

Statistical Summary. This summary shows for each stratum, the second stage sampling Mean, Coefficient of Variation and Sampling Error.

USERS ACCESS TO SWS3P

The program is written in standard fortran IV (Exhibit 6) making it compatible with most computers with only minor changes, and is presently loaded on the Forest Service computer at FCCC.

SALE I.D.
GEORGE COMPANY
WEST FORK SALE

3P SAMPLE LOG SCALING

LOAD NO 4/123

DATE 4-1-75

SCALER JCB

ESTIMATE BY STRATUM

Log No.	1 PP	2 WO	3 H	4 LP	5	6	7	8	9
1		17							
2	22								
3	13								
4			10						
5	7								
(6)	48								
7	14								
8		18							
9			7						
10			5						
11		31							
12			6						
13		20							
14	18								
15	12								
16				70					
17		24							
(18)	37								
(19)		22							
20			8						
21	30								
22	16								
23		12							
24		37							
25				65					
26			4						
7									
8									
9									
0									
Total No.	10	8	6	2					
	207	181	40	135					

Indicates Sample Logs

Total By Stratum

ESTIMATE BY STRATUM

Log No.	1	2	3	4	5	6	7	8	9
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									
Total No.									

Total By Stratum

Sheet 1

Exhibit 2

RANDOM NUMBERS

SAMPLE WEIGHT SCALING 3-26-75
L= 753159652, LIM= 4000, K= 85, K2= 300

PAGE 2

| | | |

USDA Forest Service
3P SAMPLE LOG SCALE

Date 4-1-75

Sale Ident. (Stamp)
GEORGE COMPANY
WEST FORK SALE

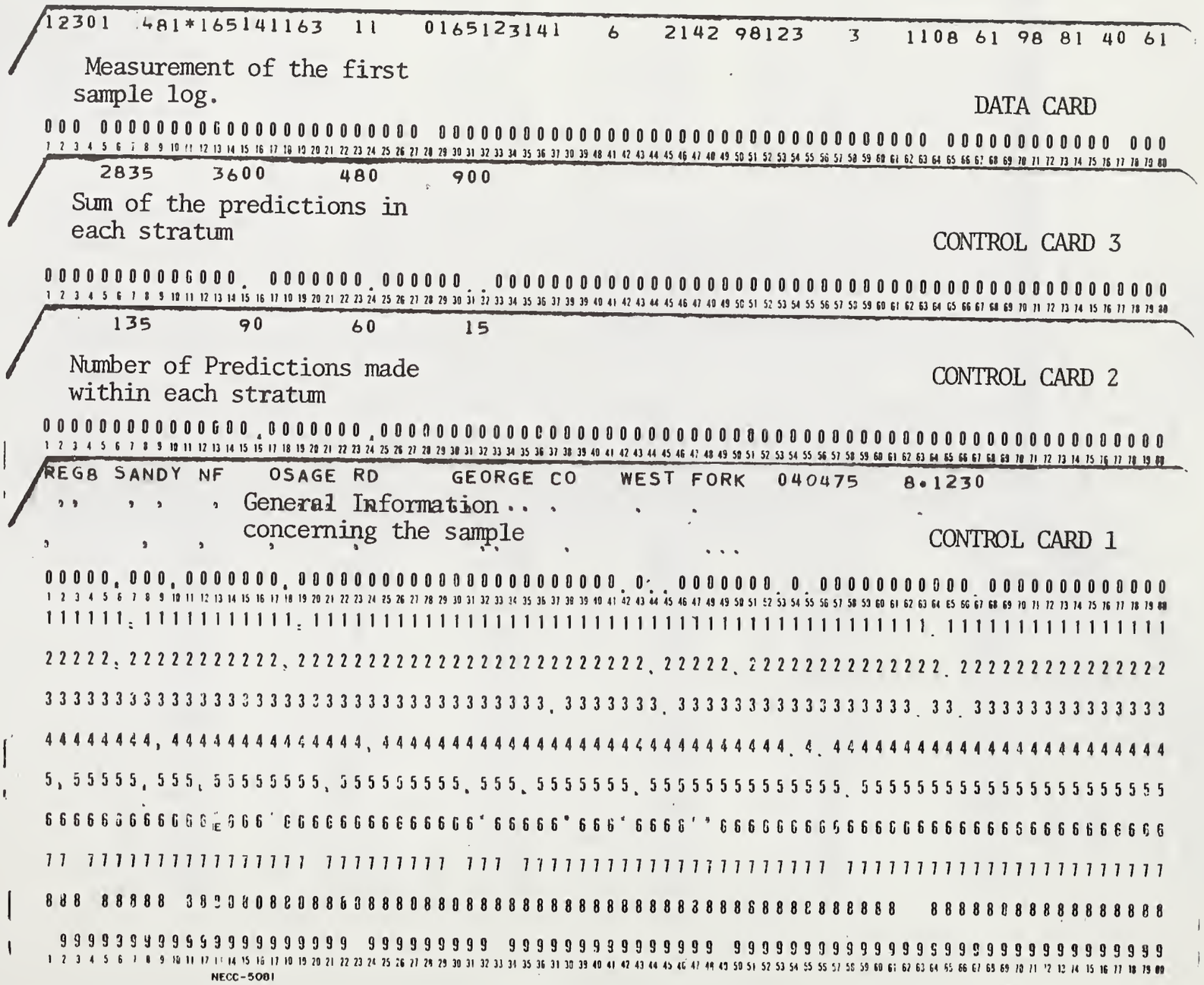
4/123
Load Number

YCE
Scaler

Adequate No. Logs Available for Check Scale
Yes X No ___

Sample Log Number	Volume Estimate (KPI)	Stratum	Sample Class*	Product	Segment Length	Top Diameter	Bottom Diameter	Net Scale	Defect
1 2 3 4 5	6 7 8 9	10	11		12 13 14 15	16 17 18	19 20 21	31 32 33 34	35 36 37 38
1 2 3 0 1	4 8	1	*	A	1 6.5	1 4.1	1 6.3	1 1	0
				B	1 6.5	1 2.3	1 4.1	6	2
				C	1 4.2	9.8	1 2.3	3	1
				D	1 0.8	6.1	9.8		
				E	8.1	4.0	6.1		
1 2 3 0 2	2 7	1	*	A	1 4.5	1 2.3	1 6.8	6	1
				B	1 4.4	7.9	1 2.3	2	
				C	1 2.5	6.1	7.9	1	
				D	1 2.7	3.9	6.1		
				E	1 5.0	.1	3.9		
1 2 3 0 3	2 2 2		*	A	1 6.4	1 0.4	1 4.6	6	
				B	1 6.5	5.9	1 0.4	2	
				C					
				D					
				E					
				A					
				B					
				C					
				D					
				E					
				A					
				B					
				C					
				D					
				E					
				A					
				B					
				C					
				D					
				E					

Remarks PRODUCT E IS WASTE MATERIAL


12301 481*165141163 11 0165123141 6 2142 98123 3 1108 61 98 81 40 61
Measurement of the first sample log.
DATA CARD
2835 3600 480 900
Sum of the predictions in each stratum
CONTROL CARD 3
135 90 60 15
Number of Predictions made within each stratum
CONTROL CARD 2
REGB SANDY NF OSAGE RD GEORGE CO WEST FORK 040475 8.1230
General Information concerning the sample
CONTROL CARD 1
NECC-5081

```
@ELT,ISL  EFIRD*CHUCK.DATA
ELTOT7 RL1870 05/13-02:53:55-(,0)
000001      000   PEGE SANDY VE   OSAGE FD     GEORGE CO    WEST FORK  040475   8.1230
000002      000        135      90       60      15
000003      000       2435    3600      480     900
000004      000   12301  461*145141163   11   0165123141   6   2142 96123   3   1108 61 98 81 40 61
000005      000   12302  271*145123168    6   1144 79123   2    125 61 79   1    127 39 61150  1 39
000006      000   12303  222*145104146    5    165 59104   2
000007      000   12401   63*                                                   209 43 67161  1 43
000008      000   12403   53*                                                   277 43 51103  1 43
000009      000   34006  754=165158187   14   2330104158  10   4330 62134   5    102 43 62 86  1 43
000010      000   34607  121*165 72129    2   1
000011      000   63702  282*145131140    4   4104116131   6   1
000012      000   63809  111*124 62124    2                                     103 60 82
000013      000   64010  261*145113168    3   2144 62113   1                    63 30 62
000014      000   00311   33*                                                  108 41 79
000015      000   00312  454* 84163185    8    230140163  15   3
000016      000   10113  151*125 91127    2   1104 73 91       1               82 41 73
000017      000   10114   81*125 71118    2                                    157 39 71
000018      000    2115   73*                                                  364 44 78
000019      000   02216  602*165178201   18   3165161178  16   0
000020      000   00117  854*165182203   19   2495104182  29   3105 61104   1     73 43 61 76  1 43
000021      000   22918    2=165461576 119  40165394461 100  12
000022      000   22919 3002=164630670 285  14

END ELT.


@XQT       EFIRD*CHUCK.SWS3P .
```

REG8 SANDY NF OSAGE NO GEORGE CO WEST FORK 04-04-75 DOM- 5/13/75 PAGE- 1

BLOW-UP FACTOR- 6.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2635.	3600.	480.	900.	0.	0.	0.	0.	0.

INPUT AND FREQUENCY SUMMARY

LOG NO - 12301 KPI - 48. STRATUM - 1 CLASS - * TOTAL CUFT - 51.3 FREQ. FACT - 6.4375

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.5	14.1	16.3	11	0	20.9
B	16.5	12.3	14.1	6	2	15.8
C	14.2	9.8	12.3	3	1	9.6
D	10.8	6.1	9.8			3.9
E	8.1	4.0	6.1			1.2

LOG NO - 12302 KPI - 27. STRATUM - 1 CLASS - * TOTAL CUFT - 31.4 FREQ. FACT - 15.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	14.5	12.3	16.8	6	1	17.1
B	14.4	7.9	12.3	2	0	8.4
C	12.5	6.1	7.9	1	0	3.4
D	12.7	3.9	6.1			1.8
E	15.0	.1	3.9			.6

LOG NO - 12303 KPI - 22. STRATUM - 2 CLASS - * TOTAL CUFT - 20.8 FREQ. FACT - 54.5455

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.4	10.4	14.6	6	0	14.4
B	16.5	5.9	10.4	2	0	6.4
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 12401 KPI - 6. STRATUM - 3 CLASS - * TOTAL CUFT - 4.5 FREQ. FACT - 20.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	.0	.0	.0	0	0	.0
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	20.9	4.3	6.7			3.6
E	18.1	.1	4.3			.9

LOG NO - 12403 KPI - 5. STRATUM - 3 CLASS - * TOTAL CUFT - 3.9 FREQ. FACT - 24.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	.0	.0	.0	0	0	.0
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	27.7	4.3	5.1			3.4
E	10.3	.1	4.3			.5

OUTPUT

Exhibit 5

REGB SAVOY NF USAGE ND GEORGE CO WEST FORK 04-04-75 DOR- 5/13/75 PAGE- 2

BLOW-UP FACTOR- 6.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

INPUT AND FREQUENCY SUMMARY

LOG NO - 34605 KPI - 75. STRATUM - 4 CLASS - = TOTAL CUFT - 60.8 FREQ. FACT - 1.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.5	15.8	18.7	14	2	27.0
B	33.0	10.4	15.8	10	4	32.2
C	33.0	6.2	13.4	5	0	19.6
D	10.2	4.3	6.2			1.6
E	8.6	.1	4.3			.4

LOG NO - 34607 KPI - 12. STRATUM - 1 CLASS - * TOTAL CUFT - 9.8 FREQ. FACT - 33.7500

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	10.5	7.2	12.9	2	1	9.8
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 43708 KPI - 28. STRATUM - 2 CLASS - * TOTAL CUFT - 26.7 FREQ. FACT - 42.8571

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	14.5	13.1	14.0	4	4	14.5
B	14.4	11.8	13.1	6	1	12.2
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 63809 KPI - 11. STRATUM - 1 CLASS - * TOTAL CUFT - 10.4 FREQ. FACT - 36.8182

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	12.4	8.2	12.4	2	0	7.5
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	10.3	6.0	8.2			2.9
E	.0	.0	.0			.0

LOG NO - 64010 KPI - 26. STRATUM - 1 CLASS - * TOTAL CUFT - 23.5 FREQ. FACT - 15.5769

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	14.5	11.3	16.8	3	2	16.2
B	14.4	6.2	11.3	1	0	6.5
C	.0	.0	.0	0	0	.0
D	6.3	3.0	6.2			.8
E	.0	.0	.0			.0

BLOW-UP FACTOR= 6.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

INPUT AND FREQUENCY SUMMARY

LOG NO - 311 KPI - 3.
STRATUM - 3
CLASS - *
TOTAL CUFT - 2.3
FREQ. FACT - 40.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	.0	.0	.0	0	0	.0
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	10.8	4.1	7.9			2.3
E	.0	.0	.0			.0

LOG NO - 312 KPI - 45.
STRATUM - 4
CLASS - *
TOTAL CUFT - 42.9
FREQ. FACT - 10.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	8.4	16.3	18.5	8	0	13.9
B	23.0	14.0	16.3	15	3	29.0
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 10113 KPI - 15.
STRATUM - 1
CLASS - *
TOTAL CUFT - 13.7
FREQ. FACT - 27.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	12.5	9.1	12.7	2	1	8.3
B	10.4	7.3	9.1	0	1	3.9
C	.0	.0	.0	0	0	.0
D	8.2	4.1	7.3			1.6
E	.0	.0	.0			.0

LOG NO - 10114 KPI - 9.
STRATUM - 1
CLASS - *
TOTAL CUFT - 9.3
FREQ. FACT - 50.6250

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	12.5	7.1	11.8	2	0	6.5
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	15.7	3.9	7.1			2.8
E	.0	.0	.0			.0

LOG NO - 2115 KPI - 7.
STRATUM - 5
CLASS - *
TOTAL CUFT - 8.0
FREQ. FACT - 17.1429

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	.0	.0	.0	0	0	.0
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	36.4	4.4	7.8			8.0
E	.0	.0	.0			.0

BLOW-UP FACTOR- 3.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

INPUT AND FREQUENCY SUMMARY

LOG NO - 2216 KPI - 60.
STRATUM - 2
CLASS - *
TOTAL CUFT - 58.4
FREQ. FACT - 20.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.5	17.8	20.1	18	3	32.4
B	16.5	16.1	17.8	16	0	25.9
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 117 KPI - 85.
STRATUM - 4
CLASS - *
TOTAL CUFT - 98.4
FREQ. FACT - 5.2941

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.5	18.2	20.3	19	2	33.4
B	49.5	10.4	18.2	29	3	59.3
C	10.5	6.1	10.4	1	0	4.2
D	7.3	4.3	6.1			1.1
E	7.6	.1	4.3			.4

LOG NO - 22918 KPI - 0.
STRATUM - 2
CLASS - =
TOTAL CUFT - 411.4
FREQ. FACT - 1.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.5	46.1	57.8	119	40	246.0
B	16.5	39.4	46.1	100	12	165.5
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

LOG NO - 22919 KPI - 300.
STRATUM - 2
CLASS - =
TOTAL CUFT - 378.3
FREQ. FACT - 1.0000

PRODUCT	LENGTH	TOP DIA.	BUTT DIA.	VOL	DEFECT	CU.FT.
A	16.4	53.0	67.0	285	14	378.3
B	.0	.0	.0	0	0	.0
C	.0	.0	.0	0	0	.0
D	.0	.0	.0			.0
E	.0	.0	.0			.0

REGB SANDY NF OSAGE RD GEORGE CO WEST FORK 04-04-75 DOR- 5/13/75 PAGE- 5

BLOW-UP FACTOR- 6.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

STRATUM AND PRODUCT REPORT

STRATUM	PRODUCT A	DEFECT	PRODUCT B	DEFECT	PRODUCT C	DEFECT	-----LINEAL FEET----- PRODUCT D	PRODUCT E
1	4272.13	866.38	781.45	356.40	327.46	68.54	14419.94	2382.83
2	10256.92	2318.54	6386.58	445.60	.00	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	17373.47	4948.53
4	1580.64	102.25	2546.80	405.19	83.62	.00	396.78	396.69
5	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	16109.69	3289.17	9714.82	1207.20	411.08	68.54	32190.20	7728.05

REGR SANDY NF OSAGE NO GEORGE CO WEST FORK 04-04-75 DUR= 5/13/75 PAGE= 6

BLOW-UP FACTOR= 5.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

CU.FT. BY PRODUCT WITHIN STRATA - -

STRATUM	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E	TOTAL
1	14983.2	3774.3	1070.2	2959.8	156.4	22943.9
2	21766.0	12655.2	.0	.0	.0	34423.2
3	.0	.0	.0	3108.9	249.7	3358.6
4	2786.7	5164.6	338.4	60.5	20.0	8372.3
5	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	.0	.0	.0
7	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0
9	.0	.0	.0	.0	.0	.0
TOTAL	39539.9	21594.2	1408.6	6129.2	426.1	.0

REG8 SANDY NF OSAGE RD GEORGE CO WEST FORK 04-04-75 DOR- 5/13/75 PAGE- 7

BLOW-UP FACTOR- 8.1230

TOTAL POPULATION AND PREDICTION IN EACH STRATUM

135	90	60	15	0	0	0	0	0
2835.	3600.	480.	900.	0.	0.	0.	0.	0.

STATISTICAL SUMMARY

STRATUM	MEAN	CV%	SAMP.ERR
1	.996	13.49	5.098
2	.958	1.43	.825
3	.861	21.39	10.695
4	1.055	13.72	9.705
5	.000	.00	.000
6	.000	.00	.000
7	.000	.00	.000
8	.000	.00	.000
9	.000	.00	.000
TOTAL	.963	14.64	3.659

*PRT,S EFIRD*CHUCK,CHUCK
FURPUR 0026-05/13-02:54

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*FOR,SI SWS3P
FOR S 4R1   E =10/26/79=09:28:32 (,0)

   MAIN PROGRAM

   STORAGE USED: CODE(1) 001151; DATA(0) 001050; BLANK COMMON(2) 000000


   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NINTR$
    0004   NRDU$
    0005   NIO3$
    0006   NIO1$
    0007   NIO2$
    0010   NPRT$
    0011   NWBU$
    0012   NWEF$
    0013   NREW$
    0014   NRBU$
    0015   SQRT
    0016   XPRR
    0017   NSTOP$


   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000235 10L      0000   000444 100F     0001   001145 1000L    0000   000454 101F     0000   000504 102F
    0000   000513 103F     0000   000524 104F     0000   000641 105F     0000   000701 106F     0000   000706 107F
    0000   000714 108F     0000   000723 109F     0000   000733 110F     0000   000745 111F     0000   000777 112F
    0000   001004 113F     0000   001010 114F     0001   000116 152G     0001   000152 165G     0001   000040 2L
    0001   000257 20L      0001   000265 21L      0001   000070 3L       0001   000701 30L      0001   000517 323G
    0001   000566 350G     0001   000567 353G     0001   000606 363G     0001   000610 366G     0001   000626 377G
    0001   000634 405G     0001   000765 441G     0001   000773 446G     0001   001042 472G     0001   001050 477G
    0001   000563 500L     0001   001116 523G     0001   001141 900L     0000 R 000403 BLOW     0000 R 000255 CUV
    0000 R 000222 CV       0000 R 000022 DAT      0000 R 000423 FF       0000 I 000415 I        0000 I 000413 IC
    0000 I 000404 ID       0000 I 000406 IDK      0000 I 000405 IDP      0000 I 000356 INHED    0000 I 000425 IOD
    0000 I 000424 IOL      0000 I 000402 IPAGE    0000 I 000000 IPOP     0000 I 000412 IS       0000 I 000443 J
    0000 I 000427 JOD      0000 I 000426 JOL      0000 I 000414 K        0000 I 000431 KOD      0000 I 000430 KOL
    0000 I 000410 KOUNT    0000 R 000376 KPI      0000 I 000421 KPIS     0000 R 000011 KPIT     0000 I 000432 KREE
    0000 I 000401 KUL      0000 I 000407 LINE     0000 I 000377 MRE      0000 I 000400 MST      0000 R 000244 MU
    0000 I 000411 NO       0000 R 000422 RAT      0000 R 000060 RPT      0000 R 000233 SE       0000 R 000200 SRAT
    0000 R 000211 SSRAT    0000 R 000420 SYI      0000 R 000343 SYIS     0000 R 000441 TCV      0000 R 000440 TMU
    0000 R 000170 TOT      0000 R 000350 TOTC     0000 R 000442 TSE      0000 R 000435 TSRAT    0000 R 000436 TSSRAT
    0000 R 000417 TTYI     0000 R 000437 TVAR     0000 R 000433 TXN      0000 R 000416 TYI      0000 R 000434 VAR
    0000 R 000047 XN


00101      1*          DIMENSION IPOP(9),KPIT(9),DAT(21),XN(9),                                    000000
00101      2*         *          RPT(8,9), TOT(8),SRAT(9),SSRAT(9),CV(9),SE(9),MU(9)               000000
00101      3*         *         ,CUV(6,9),SYIS(5),TOTC(6),INHED(16)                                000000
00103      4*          REAL KPI,KPIT,MU                                                           000001
00104      5*          DATA MRE,MST,KUL/5,7,1H=/                                                  000001
00110      6*          IPAGE = IPAGE + 1                                                          000001
00111      7*          READ(MRE,100,END=900) INHED,BLOW,ID,IPOP,IDP,KPIT,IDK                      000004
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00122      8*          IF (BLOW .GT. 0) GO TO 2                                                    000032
00124      9*          BLOW = 1.                                                                   000035
00125     10*       2  PRINT 101, INHED,           IPAGE,BLOW,IPOP,KPIT                          000040
00134     11*          LINE = 16                                                                   000057
00135     12*          IPAGE = 1                                                                   000061
00136     13*          PRINT 102                                                                   000063
00140     14*     3    KOUNT = KOUNT + 1                                                           000070
00140     15*     C                                                                                000070
00140     16*     C  CALCULATE CUFT PER STEM                                                       000070
00140     17*     C                                                                                000070
00141     18*          READ(MRE,103,END=20) NO,KPI,IS,IC, DAT                                      000072
00150     19*          K = 2                                                                       000111
00151     20*          DO 5 I = 1, 3                                                               000116
00154     21*          TYI=    ((((DAT(K)/2.)**2 *3.1416)+((DAT(K+1)/2.)**2 *3.1416))/2.           000122
00154     22*         **(DAT(K-1)*12.))/1728.                                                      000122
00155     23*          SYIS(I) = TYI                                                               000135
00156     24*          TTYI = TTYI + TYI                                                           000136
00157     25*          TYI = 0.0                                                                   000140
00160     26*          K = K + 5                                                                   000141
00161     27*     5    CONTINUE                                                                    000145
00163     28*          K = 17                                                                      000145
00164     29*          DO 6 I = 1, 2                                                               000152
00167     30*          TYI=    ((((DAT(K)/2.)**2 *3.1416)+((DAT(K+1)/2.)**2 *3.1416))/2.           000156
00167     31*         **(DAT(K-1)*12.))/1728.                                                      000156
00170     32*          SYIS(I+3)=TYI                                                               000171
00171     33*          TTYI = TTYI + TYI                                                           000172
00172     34*          TYI = 0.0                                                                   000174
00173     35*          K = K + 3                                                                   000175
00174     36*     6    CONTINUE                                                                    000201
00176     37*          SYI = TTYI                                                                  000201
00177     38*          TTYI = 0.0                                                                  000202
00177     39*     C                                                                                000202
00177     40*     C  CALCULATE RATIO OF VOL TO KPI, SUM OF RATIOS AND SUM OF SQUARES OF            000202
00177     41*     C  RATIOS                                                                        000202
00177     42*     C                                                                                000202
00200     43*          IF(IC .EQ. KUL) GO TO 10                                                    000203
00202     44*          KPIS = KPIS + KPI                                                           000206
00203     45*          RAT = SYI/KPI                                                               000221
00204     46*          SRAT(IS) = SRAT(IS) + RAT                                                   000223
00205     47*          SSRAT(IS) = SSRAT(IS) + RAT**2                                              000225
00206     48*          XN(IS) = XN(IS) + 1.                                                        000231
00207     49*     10   WRITE(MST) NO,KPI,IS,IC, DAT,SYI,SYIS                                       000235
00220     50*          SYI = 0.0                                                                   000254
00221     51*          GO TO 3                                                                     000255
00222     52*     20   ENDFILE MST                                                                000257
00223     53*          REWIND MST                                                                  000261
00223     54*     C                                                                                000261
00223     55*     C  READ EACH STEM FROM SCRATCH AND CALCULATE THE FREQUENCY FACTOR                000261
00223     56*     C                                                                                000261
00224     57*     21   READ(MST,END= 500) NO,KPI,IS,IC,DAT,SYI,SYIS                               000265
00235     58*          IF (IC.EQ.KUL)  KPI=1.                                                      000305
00237     59*          FF = KPIT(IS) / XN(IS) / KPI                                                000312
00240     60*          IF(IC .EQ. KUL) FF = 1.                                                     000317
00240     61*     C                                                                                000317
00240     62*     C  PRINT THE LINE ITEM AND STUFF THE OUTPUT ARRAY                                000317
00240     63*     C                                                                                000317
00242     64*          IOL = DAT( 4)                                                               000333
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00243     65*            IOD = DAT( 5)                                                                    000342
00244     66*            JOL = DAT( 9)                                                                    000351
00245     67*            JOD = DAT(10)                                                                    000360
00246     68*            KOL = DAT(14)                                                                    000367
00247     69*            KOD = DAT(15)                                                                    000376
00250     70*            PRINT 104, NO,KPI,IS,   DAT(1),DAT(2),DAT(3),IOL,IOD,SYIS(1), IC,D               000405
00250     71*           *AT(6),     DAT(7),DAT(8),JOL,JOD,SYIS(2),SYI,DAT(11),DAT(12),DAT(1             000405
00250     72*           *3),        KOL,KOD,SYIS(3),FF,DAT(16),DAT(17),DAT(18),SYIS(4),DAT(             000405
00250     73*           *19),       DAT(20),DAT(21),SYIS(5)                                              000405
00312     74*            RPT(1,IS) = RPT(1,IS) + DAT( 4) * FF                                            000451
00313     75*            RPT(2,IS) = RPT(2,IS) + DAT( 5) * FF                                            000456
00314     76*            RPT(3,IS) = RPT(3,IS) + DAT( 9) * FF                                            000462
00315     77*            RPT(4,IS) = RPT(4,IS) + DAT(10) * FF                                            000466
00316     78*            RPT(5,IS) = RPT(5,IS) + DAT(14) * FF                                            000472
00317     79*            RPT(6,IS) = RPT(6,IS) + DAT(15) * FF                                            000476
00320     80*            RPT(7,IS) = RPT(7,IS) + DAT(16) * FF                                            000502
00321     81*            RPT(8,IS) = RPT(8,IS) + DAT(19) * FF                                            000506
00322     82*            DO 23 I = 1, 5                                                                  000517
00325     83*            CUV(I,IS) = SYIS(I) * FF + CUV(I,IS)                                            000517
00326     84*      23    CONTINUE                                                                        000523
00330     85*            KREE = KREE + 1                                                                 000523
00331     86*            IF (KREE .LT. 5) GO TO 21                                                       000526
00333     87*            KREE = 0                                                                        000531
00334     88*            IPAGE = IPAGE + 1                                                               000532
00335     89*            PRINT 101, INHED,            IPAGE,BLOW,IPOP,KPIT                               000535
00344     90*            PRINT 102                                                                       000555
00346     91*            GO TO 21                                                                        000561
00346     92*      C                                                                                     000561
00346     93*      C  COMPUTE THE TOTAL LINE                                                             000561
00347     94*      500   DO 25 I = 1, 8                                                                  000567
00352     95*            DO 25 K = 1, 9                                                                  000567
00355     96*            RPT(I,K) = RPT(I,K) * BLOW                                                      000567
00356     97*            TOT(I) = RPT(I,K) + TOT(I)                                                      000571
00357     98*      25    CONTINUE                                                                        000610
00362     99*            DO 27 K = 1, 9                                                                  000610
00365    100*            DO 27 I = 1, 5                                                                  000610
00370    101*            CUV(I,K) = CUV(I,K) * BLOW                                                      000610
00371    102*            CUV(6,K) = CUV(6,K) + CUV(I,K)                                                  000612
00372    103*            TOTC(I) = TOTC(I) + CUV(I,K)                                                    000614
00373    104*      27    CONTINUE                                                                        000626
00376    105*            DO 28 I = 1,9                                                                   000626
00401    106*            TOTC(6) = TOTC(6) + CUV(6,I)                                                    000626
00402    107*      28    CONTINUE                                                                        000634
00402    108*      C                                                                                     000634
00402    109*      C  CALCULATE STATISTICS                                                               000634
00402    110*      C                                                                                     000634
00404    111*            DO 30 I = 1, 9                                                                  000634
00407    112*            IF (XN(I).EQ.0) GO TO 30                                                        000634
00411    113*            TXN = TXN + XN(I)                                                               000635
00412    114*            MU(I) = SRAT(I) / XN(I)                                                         000640
00413    115*            VAR =  (SSRAT(I) -  (SRAT(I )**2/ XN(I))) / (XN(I)-1)                           000643
00414    116*            CV(I) =   SQRT(VAR)/ MU(I) * 100.                                               000653
00415    117*            SE(I) = CV(I) / XN(I) ** .5                                                     000661
00416    118*            TSRAT = TSRAT + SRAT(I)                                                         000672
00417    119*            TSSRAT = TSSRAT + SSRAT(I)                                                      000675
00420    120*      30    CONTINUE                                                                        000702
00420    121*      C                                                                                     000702
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00420    122*     C  COMPUTE THE TOTAL STATISTICS                                                    000702
00420    123*     C                                                                                  000702
00422    124*           TVAR = (TSSRAT - (TSRAT**2 / TXN))/ (TXN - 1)                                000702
00423    125*           TMU = TSRAT / TXN                                                            000712
00424    126*           TCV =  SQRT(TVAR) / TMU * 100.                                               000715
00425    127*           TSE = TCV / TXN ** .5                                                        000723
00425    128*     C                                                                                  000723
00425    129*     C  PRINT THE REPORT                                                                000723
00425    130*     C                                                                                  000723
00426    131*           IPAGE = IPAGE + 1                                                            000732
00427    132*           PRINT 101, INHED,            IPAGE,BLOW,IPOP,KPIT                            000735
00436    133*           PRINT 105                                                                    000755
00440    134*           DO 35 K = 1,9                                                                000765
00443    135*           PRINT 106, K, ( RPT(I,K), I = 1,8)                                           000765
00452    136*     35    CONTINUE                                                                     001000
00454    137*           PRINT 107, (TOT(I), I = 1, 8)                                                001000
00457    138*           IPAGE = IPAGE + 1                                                            001007
00460    139*           PRINT 101, INHED,            IPAGE,BLOW,IPOP,KPIT                            001012
00467    140*           PRINT 111                                                                    001032
00471    141*           DO 37 J = 1, 9                                                               001042
00474    142*           PRINT 112, J,(CUV(I,J),I=1,6)                                                001042
00503    143*     37    CONTINUE                                                                     001055
00505    144*           PRINT 113, (TOTC(I),I=1,6)                                                   001055
00510    145*           IPAGE = IPAGE + 1                                                            001064
00511    146*           PRINT 101, INHED,            IPAGE,BLOW,IPOP,KPIT                            001067
00520    147*           PRINT 114                                                                    001107
00522    148*           DO 40 K = 1, 9                                                               001116
00525    149*           PRINT 108, K, MU(K),CV(K),SE(K)                                              001116
00533    150*     40    CONTINUE                                                                     001130
00535    151*           PRINT 109, TMU,TCV,TSE                                                       001130
00542    152*           GO TO 1000                                                                   001137
00543    153*     900   PRINT 110                                                                    001141
00543    154*     C                                                                                  001141
00545    155*     100   FORMAT(13A4,3A2,F9.4,9X,A3/9I8, 4X,A3/9F8.0,4X,A3)                          001145
00545    156*     C                                                                                  001145
00546    157*     101   FORMAT(1H1,13A4,3A2,36X,                                                    001145
00546    158*          *      'PAGE= ',I3//1H ,'BLOW-UP FACTOR=',F9.4//1H ,9X,'TOTAL POPUL          001145
00546    159*          *ATION AND PREDICTION IN EACH STRATUM'/1H0,9I8,/ 1H ,9F8.0//)                 001145
00546    160*     C                                                                                  001145
00547    161*     102   FORMAT('0   INPUT AND FREQUENCY SUMMARY')                                   001145
00547    162*     C                                                                                  001145
00550    163*     103   FORMAT(I5,F4.0,I1,A1,3(F3.1,2F3.1,2F4.0),2(F3.1,2F3.1))                    001145
00550    164*     C                                                                                  001145
00551    165*      104  FORMAT('0LOG NO = ',I5,'      KPI    = ',F4.0,T44,'PRODUCT LENGTH          001145
00551    166*          * TOP DIA.  BUTT DIA.  VOL  DEFECT   CU.FT.'/' ',T21,'STRATUM = ',I        001145
00551    167*          *1,T46,'A ',2(5X,F4.1),7X,F4.1,2(3X,I4),4X,F5.1/' ',T21,'CLASS   =         001145
00551    168*          *',A1,T46,'B ',2(5X,F4.1),7X,F4.1,2(3X,I4),4X,F5.1/' ',T18,'TOTAL C        001145
00551    169*          *UFT = ',F5.1,T46,'C ',2(5X,F4.1),7X,F4.1,2(3X,I4),4X,F5.1/' ',T18,        001145
00551    170*          *'FREQ. FACT =',F9.4,T46,'D ',2(5X,F4.1),7X,F4.1,18X,F5.1/' ',T46,'        001145
00551    171*          *E ',2(5X,F4.1),7X,F4.1,18X,F5.1//)                                        001145
00551    172*     C                                                                                  001145
00552    173*     105   FORMAT('0  STRATUM AND PRODUCT REPORT',T92,'-----LINEALFEET-----'/           001145
00552    174*          *'/' STRATUM',5X,3('PRODUCT',7X,'DEFECT',6X),2('PRODUCT',6X)/' ',T17        001145
00552    175*          *,'A',T43,'B',T69,'C',T95,'D',T108,'E')                                      001145
00552    176*     C                                                                                  001145
00553    177*     106   FORMAT(1H0,3X,I1,6X,8(F11.2,2X))                                           001145
00553    178*     C                                                                                  001145
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00554    179*      107   FORMAT(1H0,2X,'TOTAL    ',8(F11.2,2X))                                                  001145
00554    180*      C                                                                                             001145
00555    181*      108   FORMAT(1H0,6X,I1,10X,F9.3,8X,F6.2,11X,F8.3)                                             001145
00555    182*      C                                                                                             001145
00556    183*      109   FORMAT(1H0,4X,'TOTAL', 8X,F9.3,8X,F6.2,11X,F8.3)                                        001145
00557    184*      110   FORMAT(1H1,'MISSING HEADING CARD - PROCESSING WILL STOP,SORRY')                         001145
00560    185*      111   FORMAT(1H0,'  CU.FT. BY PRODUCT WITHIN STRATA - -'//1H ,'STRATUM                        001145
00560    186*           *   ',5('PRODUCT',5X),'  TOTAL'/1H ,15X,'A',11X,'B',11X,'C',11X,'D'                     001145
00560    187*           *,11X,'E'//)                                                                            001145
00561    188*      112   FORMAT(1H ,3X,I1,3X,6(1X,F11.1)//)                                                     001145
00562    189*      113   FORMAT(1H0,'  TOTAL' ,6F12.1)                                                          001145
00563    190*      114   FORMAT(1H0,2X,                                    'STATISTICAL SUMMARY'               001145
00563    191*           *//1H ,2X,'STRATUM',10X,'MEAN',12X,'CV%',13X,'SAMP.ERR')                                001145
00564    192*      1000  STOP                                                                                    001145
00565    193*            END                                                                                     001150

       END OF COMPILATION:        NO  DIAGNOSTICS.
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